STATE OF CALIFORNIA
STANDARD AGREEMENT
STD 213 (Rev 06/03)

AGREEMENT NUMBER
10-C0120
REGISTRATION NUMBER

1. This Agreement is entered into between the State Agency and the Contractor named below:

STATE AGENCY'S NAME
Department of Pesticide Regulation (DPR)

CONTRACTOR'S NAME
The Regents of the University of California

2. The term of this Agreement is: May 16, 2011 or upon final approval by the State, whichever occurs later, through December 31, 2012

3. The maximum amount of this Agreement is: **$ 41,896.00**
Forty-one thousand eight hundred ninety-six dollars and no cents

4. The parties agree to comply with the terms and conditions of the following exhibits which are by this reference made a part of the Agreement.

Exhibit A – Scope of Work	5 Pages
Exhibit B – Budget Detail and Payment Provisions	4 Pages
Exhibit C* – General Terms and Conditions (GIA 610)	
Exhibit D - Special Terms and Conditions	2 Pages
Exhibit E – Additional Terms and Conditions	1 Page
Exhibit F – Resume	3 Pages

Items shown with an Asterisk (*), are hereby incorporated by reference and made part of this agreement as if attached hereto. *These documents can be viewed at* http://www.ols.dgs.ca.gov/Standard+Language/default.htm

IN WITNESS WHEREOF, this Agreement has been executed by the parties hereto.

CONTRACTOR

CONTRACTOR'S NAME *(if other than an individual, state whether a corporation, partnership, etc.)*
The Regents of the University of California

BY *(Authorized Signature)*: Sandra M Stevens — DATE SIGNED *(Do not type)*: 6/6/11

PRINTED NAME AND TITLE OF PERSON SIGNING
Sandra M. Stevens
Associate Director, Sponsored Programs

ADDRESS
1850 Research Park Drive
Davis, CA 95618

STATE OF CALIFORNIA

AGENCY NAME
Department of Pesticide Regulation

BY *(Authorized Signature)*: Samantha Lewis — DATE SIGNED *(Do not type)*: 6-9-11

PRINTED NAME AND TITLE OF PERSON SIGNING
Samantha Lewis, Business Services Office Manager

ADDRESS
1001 I Street, Sacramento, CA 95814

California Department of General Services Use Only

☒ Exempt per:

Delegation Letter 74.4

EXHIBIT A
STANDARD AGREEMENT

SCOPE OF WORK

1. The Regents of the University of California is hereinafter referred to as UC Davis or Contractor
2. This Agreement will commence on the start date May 16, 2011 as presented herein or upon final approval by the State, whichever is later and no work shall begin before that time. This Agreement is of no effect unless approved by the State. Contractor shall not receive payment for work performed prior to approval of the Agreement and before receipt of notice to proceed by the Contract Manager. This Agreement shall expire on December 31, 2012. The services shall be provided during normal working hours, Monday through Friday, except State holidays.
3. The Project Representatives during the term of this Agreement will be:

   A. All official communications, except invoices, from the Contractor to DPR shall be directed to the attention of the DPR Contract Manager, Mike Ensminger, at:

   Department of Pesticide Regulation
   Environmental Monitoring Branch, MS-3B
   1001 I Street
   P.O. Box 4015
   Sacramento, CA 95812-4015

   Phone (916) 324-4186 Fax (916) 324-4088
   E-Mail: mensminger@cdpr.ca.gov

   B. All invoices from the Contractor to DPR shall be directed to:

   Department of Pesticide Regulation
   Attn: Accounts Payable
   P.O. Box 4015, MS 4A
   Sacramento, CA 95812-4015

   C. All programmatic communications from DPR to the Contractor shall be directed to the attention of Dr. Swee Teh at:

   Department of Anatomy, Physiology and Cell Biology
   1203 Haring Hall
   School of Veterinary Medicine
   University of California
   One Shields Avenue
   Davis, CA 95616-8780

   Phone: (530) 754 8183; Fax: (530) 752-7690

   Email: sjteh@ucdavis.edu

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D. All administrative communications and payments from DPR to the Contractor shall be directed to:

Office of Research, Sponsored Programs
1850 Research Park Drive
Suite 300
Davis, CA 95618-6153
Phone: (530) 754-7700; FAX: (530) 754-8229

Email Address: vcresearch@ucdavis.edu

E. The Project Representatives during the term of this Agreement may be changed by mutual written agreement without the necessity of formal amendment to this Agreement.

4. UC Davis agrees to provide the following services:

A. Background and Goals

1) There are numerous factors that could contribute to the decline in *Eurytemora affinis* and *Pseudodiaptomus forbesi* population size, one factor of emerging concern is pesticide exposure. Two commonly prevalent pesticide types in the San Francisco Estuary (SFE) are Organophosphates (OP) and Pyrethroids (PY). OPs are a group of broad spectrum insecticides that have a wide variety of uses including agricultural, commercial (veterinary), and private. OP causes neurotoxicity effects by phosphorylating the acetylcholinesterase enzymes. In contrast, pyrethroids are a class of neurotoxin pesticides that cause toxicity by disrupting the sodium channels in neurons. Pyrethroids also have a wide variety of uses, ranging from agricultural to pharmaceutical home use.

2) In the early 2000s OPs were banned from most urban uses. As a result, consumers switched pesticide use from the dominantly OPs to mostly pyrethroids. While OPs are generally banned from most urban uses, they can still be found in the SFE waters. Due to its toxicity to target organisms, the use rate of the pyrethroids is much lower than the OPs use rate and thus pyrethroids require less compound to be toxic. The result is a decrease in overall pesticide use, but a markedly increase in sensitivity to these pesticides.

3) Interestingly, the shift in pesticide use occurred approximately at the same time the pelagic organism decline (POD) decline was first observed. While POD is likely due to a combination of several factors, the shift in pesticide use and its affect on the prey species (like *E. affinis* and *P. forbesi*) species may be a reason for the decline. Providing the link between phytoplankton and juvenile fish species and other higher trophic level organisms, the health of copepod

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populations in aquatic food webs and its relationship with pesticide use in the SFE, is of growing concern.

4) Preliminary studies in our laboratory indicate that *P. forbesi* and *E. affinis* are highly sensitive to pesticides found in the SFE. The 96 h medial lethal concentrations (LC_{50}s) of chlorpyrifos were 803.2 ng/L and 1211.9 ng/L for *E. affinis* and *P. forbesi*, respectively. These results indicate that *E. affinis* is more sensitive than *P. forbesi* to OPs. However, *P. forbesi* is almost two times more sensitive to permethrin than is *E. affinis* (96h LC_{50}s of 86.0 and 158.1 ng/L, respectively). For bifenthrin, the 96h LC_{50} value for *E. affinis* is 13.3 ng/L whereas the LC_{50} for *P. forbesi* is 19.40 ng/L. There is approximately 100-fold increase in sensitivity of *E. affinis* and *P. forbesi* to pyrethroid insecticides when compared to organophosphate insecticides.

5) Given the importance of *E. affinis* and *P. forbesi* as an important food source for several POD species in addition to the prevalence of pesticides in the SFE, it is important to study the effects of pesticides on these species. The goals of the proposed study are three fold:

   a. Determine the acute and chronic toxic effect of pesticides on *E. affinis* and *P. forbesi*;
   b. Determine the influence of changes in abiotic factors (pH, and temperature) on the toxicity of pesticides to *E. affinis* and *P. forbesi*;
   c. Develop a population dynamics model for copepod populations in the SFE.

B. Work to Be Performed

Task 1. Acute and Chronic Effects of Pesticides

- Establish optimum culture conditions to ensure that high quality and quantity of all life stages of the copepods will be available for the acute and chronic bioassays.

- Determine the 96h LC_{50} values of key pesticides (pyrethroid insecticides, organophosphate insecticides, fipronil, herbicides, and fungicides) to *E. affinis* and *P. forbesi*.

- Determine the differences in sensitivity of the three life stages of copepods to key pesticides.

- Determine the chronic effects of key pesticides on reproduction of copepods.

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Task 2. Abiotic Interactions

- Determine the sensitivity of copepods to different physicochemical stressors.

Task 3. Modeling

- Data obtained from task one and two of this study will be used to develop a population dynamics model for copepod populations in the SFE. Variables in the model will include pesticide type and concentration, water quality variable (temperature, pH, and salinity), seasonality, and estimated zooplankton population sizes. The output of the model will be the change in zooplankton abundance in the SFE in regards to the parameters of the model. A model is important to managers and scientists because it quantifies the changes in zooplankton abundance in the SFE. The data obtained in this model can be used to determine the optimal timing and methods of applying pesticides in the agricultural lands that discharge into the delta. The ultimate result would be an increase in zooplankton populations leading to an overall healthier delta ecosystem.

C. Project Timeline

Date:		2011								2012											
		M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
Task	Product																				
1	Acute and Chronic Effects of Pesticides																				
	Copepod culture	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
	Acute & chronic testing	X	X	X	X	X	X	X	X	X	X	X	X	X	X						
2	Abiotic Interactions																				
	Physio-chemical testing								X	X	X	X	X	X	X	X	X	X	X	X	X
3	Modeling																				
	Data analysis and modeling								X	X	X	X	X	X	X	X	X	X	X	X	X
1-3	Scientific publication and review																				
	Semi-annual reports to DPR								X						X						X
	Submission to Scientific publication																				X
	State conferences and meetings	As appropriate (TBD)																			

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5. DPR's Responsibilities

DPR shall review annual reports and papers being submitted for publication within 30 days of submission.

EXHIBIT B
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BUDGET DETAIL AND PAYMENT PROVISIONS

1. Invoicing

A. For services satisfactorily rendered, in accordance with the scope of work and approved by the Contract Manager and upon receipt and approval of the invoices, DPR agrees to compensate Contractor, in arrears, for actual allowable costs incurred as specified herein and in accordance with the rates specified herein or attached hereto. Incomplete or disputed invoices shall be returned to Contractor, unpaid, for correction.

B. Invoices shall include the Agreement Number and shall be submitted in triplicate, not more frequently than monthly or less than quarterly in arrears, to:

Department of Pesticide Regulation
Attn: Accounts Payable
P.O. Box 4015, MS-4A
Sacramento, CA 95812-4015

2. Budget Contingency Clause

A. It is mutually agreed that if the Budget Act of the current year and/or any subsequent years covered under this Agreement does not appropriate sufficient funds for the program, this Agreement shall be of no further force and effect. In this event, DPR shall have no liability to pay any funds whatsoever to Contractor or to furnish any other considerations under this Agreement and Contractor shall not be obligated to perform any provisions of this Agreement.

B. If funding for any fiscal year is reduced or deleted by the Budget Act for purposes of this program, DPR shall have the option to either cancel this Agreement with no liability occurring to DPR, or offer an Agreement Amendment to Contractor to reflect the reduced amount.

3. Payment

A. Costs for this Agreement shall be computed in accordance with State Administrative Manual (SAM) Sections 8752 and 8752.1.

B. Nothing herein contained shall preclude advance payments pursuant to Article 1, Chapter 3, Part 1, Division 3, Title 2 of the California Government Code, Sections 11256 and 11257.

C. Transportation and subsistence costs shall not exceed rates authorized to be paid UC system employees traveling within California.

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D. Contractor will be reimbursed for direct costs, other than salary costs, that are identified in the Contractor's rates.

E. Contractor will bill in arrears for costs incurred during the billing period. If applicable, salary costs will be itemized and billed by position. Documentation supporting specific salary costs will be presented if requested by DPR. Non-wage costs will be billed, in summary, according to general expense categories. A detailed report of transactions will support the billing. Individual expenditures exceeding $500.00 will be supported by a photocopy of the original documentation. Documentation in support of expenditures less than $500.00 will be presented if requested by DPR.

F. Contractor shall not commence the performance of work or services until after this contract has been approved by the State. No payment will be made prior to approval nor for any work performed prior to approval of this Agreement.

G. Ten percent (10%) of the total amount of this Agreement shall be withheld by DPR until the satisfactory completion of this Agreement in accordance with the scope of work.

4. Rates

Table I - Details Budget

Budget Line Item	FY 10-11 (05/11-06-11)	FY 11-12 07/11-06-12)	FY 12-13 (07/12-12/12)	TOTAL
1. Salaries & Wages①	2111	13,176	6852	22,139
2. Benefits②	223	1543	815	2581
3. Travel ③ (in state)	0	300	300	600
4. Training④	0	0	0	0
5. Supplies⑤	0	2463	1000	3463
6. GSR Fee remission	592	3551	1775	5,918
7. Minor Equipment	0	0	0	0
8. Overhead⑥ @25%	584	4370	2241	7195
Total	**$3,510**	**$25,403**	**$12,983**	**$41,896**

①FY11-12 and FY12-13 include 0.04 COLA increase
②Benefits include: Worker's Compensation and other benefits appropriate for title
③Travel includes: Invoice for payments on travel shall be based on current UC rates and guidelines
④Training for topics related to monitoring project.
⑤Supplies include: Copying services and miscellaneous supplies.
⑥Indirect Cost: 10 - 25% indirect cost rate includes: depreciation of buildings and equipment, utility consumption, operations and maintenance costs, administrative services provided at the departmental and central level, and library costs.

Table II - Details Personnel

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FY 2010-2011

Salaries & Wages	Monthly	Number of Months	Percentage of Time	Total Amount
Swee Teh (PI)	7600	2	5	760
Graduate Student	2702	2	25	1351
Total Salaries & Wages				2111
Benefits				
Swee Teh (27%)	2052	2	5	205
GSR (1.30%)	35.13	2	25	18
Total Benefits				223
Total Personnel				**$ 2334**

FY 2011-12

Salaries & Wages	Monthly	Number of Months	Percentage of Time	Total Amount
Swee Teh (PI)	7910	12	5	4746
Graduate Student	2810	12	25	8430
Total Salaries & Wages				13,176
Benefits				
Swee Teh (30.2%)	2388.82	12	5	1433
GSR (1.30%)	36.53	12	25	110
Total Benefits				1543
Total Personnel				**$14,719**

FY 2012-13

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Salaries & Wages	**Monthly**	**Number of Months**	**Percentage of Time**	**Total Amount**
Swee Teh (PI)	8226.67	6	5	2468
Graduate Student	2922.67	6	25	4384
Total Salaries & Wages				6852
Benefits				
Swee Teh (30.7%)	2525.59	6	5	758
GSR (1.30%)	37.99	6	25	57
Total Benefits				815
Total Personnel				**$7,667**

5. Cost Limitation

A. The total amount of this Agreement shall not exceed $ 41,896.00.

B. It is understood and agreed that this total is an estimate and that DPR will pay for only those services actually rendered as authorized by the DPR Contract Manager or his/her designee.

EXHIBIT D
Standard Agreement

SPECIAL TERMS AND CONDITIONS

1. Termination

A. Either Party reserves the right to terminate this agreement without cause upon thirty (30) days written notice to the other Party, or immediately in the event of a material breach. In the event of termination, Contractor shall be paid for all allowable costs incurred up to the date of termination, including any non-cancelable obligations.

B. In the event that the total Agreement amount is expended prior to the expiration date, DPR may, at its sole discretion, terminate this Agreement with 30 days notice to contractor.

2. Subcontracting

A. Contractor shall perform the work contemplated with resources available within its own organization and no portion of the work shall be subcontracted unless the subcontract(s) is identified in this Agreement.

B. Any subcontract in excess of $25,000, entered into as a result of this Agreement, shall contain all the provisions stipulated in this Agreement to be applicable to Subcontractors.

C. Any substitution of subcontractors must be approved in writing by the DPR Contract Manager in advance of assigning work to a substitute subcontractor.

3. Dispute Resolution

A. DPR reserves the right to issue an order to stop work in the event that a dispute should arise, or in the event that the DPR gives the performing agency a notice that this Agreement will be terminated. If DPR exercises this right, the stop-work order will be in effect until the dispute has been resolved or this Agreement has been terminated.

B. Any dispute concerning a question of fact arising under the terms of this Agreement which is not disposed of within a reasonable period of time by agency employees normally responsible for the administration of this agreement, shall be brought to the attention of the Executive Officer or designated representative of each agency for joint resolution.

C. The Contractor shall continue to perform all its responsibilities under this agreement during any dispute until notified to stop work or expiration of this Agreement.

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4. Harassment Free Workplace

The Department of Pesticide Regulation (DPR) is committed to providing a safe, secure environment, free from sexual misconduct. It is policy of the Department that employees have the right to work in an environment that is free from all forms of discrimination, including sexual harassment. This policy specifically speaks to freedom from a sexually harassing act that results in the creation of an intimidating, hostile or offensive work environment or that otherwise interferes with an individual's employment or work performance. As a Contractor with DPR, you and your staff are expected to comply with a standard of conduct that is respectful and courteous to DPR employees and all other persons contacted during the performance of this Agreement. Sexual harassment is unacceptable, will not be tolerated; and may be cause for prohibiting some or all of the Contractor's staff from performing work under this Agreement.

EXHIBIT E
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ADDITIONAL PROVISIONS

1. Contractor Evaluation

The Contractor is hereby notified that its performance under this Agreement may be evaluated within thirty (30) calendar days following the Expiration of this Agreement. The evaluation may include statements on the adequacy of the service or the product, whether the service was satisfactory, whether the service or the product was provided or completed within the time limitations, reasons for time or cost overruns, whether the product is operational or being utilized by the State, and/or the State plans for implementation, and the State's general impression as to the competency of the Contractor and its staff. The evaluation shall be filed in the State's official Contractor Evaluation File.

2. Consulting Services

A. The Contractor is hereby advised of its duties, obligations and rights under Public Contract Code § 10335.5.

B. The Contractor's key personnel assigned to perform work under this Agreement and their level of responsibility shall be mutually acceptable to the State and the Contractor.

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Honors and Awards NAME	POSITION TITLE
Teh, Swee Joo	Research Toxicologist/Pathologist

EDUCATION/TRAINING *(Begin with baccalaureate or other initial professional education, such as nursing, and include postdoctoral training.)*

INSTITUTION AND LOCATION	DEGREE *(if applicable)*	YEAR(s)	FIELD OF STUDY
West Virginia University, Morgantown	B.Sc.	1985	Medical Technology
West Virginia University, Morgantown	M.Sc.	1987	Human Anatomy
University of California, Davis	Ph.D.	1996	Comparative Pathology

A. Positions and Honors.

Positions and Employment

1985-1987 Graduate Research Assistant, Human Anatomy, West Virginia University
1987-2001 Staff Research Associate II-IV, Laboratory Director of Aquatic Toxicology Program, University of California-Davis
2001-2004 Assistant Research Toxicologist/Pathologist IV, Department of Anatomy, Physiology, and Cell Biology, University of California-Davis
2004-2008 Associate Research Toxicologist/Pathologist III, Department of Anatomy, Physiology, and Cell Biology, University of California-Davis
2009-Present Research Toxicologist/Pathologist I, Department of Anatomy, Physiology, and Cell Biology, University of California-Davis

America Society of Medical Technology (1985)
America Society of Clinical Pathologists (1985)
Mu Tau Medical Technology (1983)
Mu Tau Scholarship (1984)
Employee of the Month, University of California (1994-1995)
Incentive Award, University of California (1994-1995)

B. Selected Publications (26 of 55).

Teh, S.J., and Hinton, D.E. 1993. Detection of enzyme histochemical markers of hepatic preneoplasia and neoplasia in medaka (*Oryzias latipes*). Aquat.Toxicol. 24:163-182.

Teh, S.J., Adams, S.M., and Hinton, D.E. 1997. Histopathologic biomarkers in feral freshwater fish populations exposed to different types of contaminant stress. Aquat. Toxicol. 37:51-70.

Teh, S.J., and Hinton, D.E. 1998. Gender-specific growth and hepatic neoplasia in medaka (*Oryzias latipes*). Aquat. Toxicol. 41:141-159.

Teh, S.J., Clark, S.L., Brown, C., Luoma, S.N. and Hinton, D.E. 1999. Enzymatic and histopathologic biomarkers as indicator of environmental contaminant exposure and effect in Asian clam (*Potamocorbula amurensis*). Biomarker. 4:497-509.

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Teh, S.J., Miller,C.E., and Hinton, D.E. 2000. Hermaphroditism in laboratory cultured albino western mosquitofish (*Gambusia affinis affinis*). J. Aquat. Anim. Health. 12: 78-80, 2000.

Teh, S.J., Werner, I., and Hinton, D.E. 2000. Chronic Toxicity of Chromium VI in Asian Clam (*Potamocornula Amurensis*). Mar. Environ. Res. 50: 295-300.

Barron, M.G., *et al.*, **Teh, S.J.** and *et al.*, 2000. PCBs, Liver Lesions, and Biomarker Responses in Adult Walleye (*Stizostedium vitreum vitreum*) Collected from Green Bay, Wisconsin. In: Journal of Great Lakes Research. 26(3):250-271.

Teh, S.J., Deng, X., Teh, F.C., Hung, S.S.O. 2002. Selenium-induced teratogenicity in sacramento splittail (*pogonichthys macrolepidotus*). Mar. Environ. Res. 54 (3-5):605-608

Tay, K.L., **Teh, S.J.**, Doe, K., Lee, K, and Jackman, P. Histopathologic and histochemical biomarker responses of Baltic clam, Macoma balthica, to contaminated Sydney Harbour sediment, Nova Scotia, Canada. Environ. Health Persp. 111 (3): 273-280 2003.

Teh, S.J., Wong, C., Furtula, V, and Teh, FC. Lethal and Sublethal Toxicity of Didecyldimethylammonium Chloride (DDAC) in Early Life Stages of White Sturgeon (Acipenser transmontanus). Accepted in Environ. Tox. Chem.

Teh, S.J., Deng, X., Deng, D.F., Teh, F.C., Hung, S.S.O., Fan, W-M.T, Liu, J., and Higashi. Chronic Effects of Dietary Selenium on Juvenile Sacramento Splittail (*Pogonichthys Macrolepidotus*). Environ. Sci. Technol.; 38(22) pp 6085 - 6093. 2004

Teh, S.J., Deng, D.F., Werner, I., Teh, FC, and Hung, S.S.O. Sublethal Toxicity of Orchard Stormwater Runoff in Sacramento Splittail (*Pogonichthys macrolepidotus*) Larvae. Mar. Environ. Res. 59: 203-216. 2005

Tashjian, D.H., **Teh, S.J.**, Sogomonyan, A., and Hung, S.S.O. Bioaccumulation and chronic toxicity of dietary L-selenomethionine in juvenile white sturgeon. Aqua. Toxicol. 79(4):401-409. 2006

Hall, L.C., Okihiro, M., Johnson, M.L., and **Teh, S.J.** Surflantrade mark and oryzalin impair reproduction in the teleost medaka (Oryzias latipes). Mar. Environ. Res. 63 115-131, 2007

León, A., **Teh, S.J.**, Hall, L.C., and Teh, F.C. Androgen Disruption of Early Development in Qurt Strain Medaka (*Oryzias latipes*). Aquat. Toxicol. 82: 195-203. 2007

Deng, D.F., Hung, S.S.O., and **Teh, S.J.** Selenium depuration: Residual effects of dietary selenium on Sacramento splittail (*Pogonichthys macrolepidotus*). Sci of the Total Environ. 377: 224-232. 2007

León, A., Wu, P.S., Hall, L.C., Johnson, M.L., and **Teh, S.J.** Global Gene Expression Profiling of Androgen Disruption in Qurt Strain Medaka. Environ Sci. Technol. 42: 962-969 2008

Greenfield, B.K., **Teh, S.J.**, John R Ross, Hunt, J., Zhang, G.H., Davis, J.A., Ichikawa, G.,Crane, D., Hung, S.S.O., Deng, DF., Teh, F.C., Green, P.G. Contaminant concentrations and histopathological effects in Sacramento splittail. Archives of Environ Contam and Toxicol 55:2 :270 -81 2008

Deng, D.F., Teh, F.C, and **Teh, S.J.** Effect of Dietary Methylmercury and Seleno-methionine on Sacramento Splittail Larvae. Sci of the Total Environ. 407: 197-203, 2008

Ger, K.A., **Teh, S.J.** and Goldman, C.R. Microcystin-LR toxicity on dominant copepods *Eurytemora affinis* and *Pseudodiaptomus forbesi* of the San Francisco Estuary. Sci of the Total Environ. 407:4852–4857, 2009